

- 1 -

# Description

5

## Active instrument for determining a position in navigation systems for assisting surgical operations

10

The innovation relates to an active instrument for determining a position in navigation systems for assisting surgical operations.

15

It is known to display the location of a surgical instrument or a pointing instrument (in the following just called instrument) in a patient's body on a monitor for a surgeon during operation. For this purpose, before operating, a tomogram, e.g. a computer tomogram (CT) or a magnetic resonance tomogram (MRT), of the part of the patient's body to be operated is recorded. During operation the instrument's position in space is detected by means of a measuring system, e.g. by means of two cameras, by analyzing the location of light sources fixed on the instrument. This location is displayed on a monitor together with the tomograms. The location of the patient or the part of the body to be operated during surgery is determined by markings being attached or being reproducibly attachable to the patient both during recording of the tomogram and during surgery. The location of these markings is detected during surgery. This may be done by getting the instrument to these markings and determining its position. Thus, the patient's position in space is known and there exists a definite relation between the patient's position and the tomograms.

20

At known „active instruments“ of this kind the power supply of the instruments is effected via a cable. Such a cable is disturbing and causes problems at sterilizing the instrument.

25

It is also known to use an inserted accumulator for the power supply. For charging the accumulator and for sterilizing the instrument this accumulator has to be removed.

30

35

0914640-021402

It is an object of this invention to improve the power supply of an active instrument for determining a position in navigation systems for assisting surgical operations.

According to the present invention this object is solved in that the energy for the power supply of the instrument is supplied by means of a wireless power transmission means.

Preferably this is achieved by the instrument carrying at least one solar cell for its power supply.

During surgery the operation area usually is illuminated very brightly. This illumination can be used via the solar cell or solar cells for generating the relatively small electrical power necessary in the instrument e.g. for feeding light emitting diodes.

It is also possible that the instrument comprises a buffer (e.g. a capacitor) being chargeable by the solar cell for temporary buffering of power supply.

The instrument may comprise light sources for detecting the position of the instrument, which light sources are fed from the power supply. The instrument may also comprise a wireless communicating means which is also fed from the power supply. This communication means may serve for identifying the instrument or controlling the light source, e.g. for turning the light source on and off.

One embodiment of the invention is explained below referring to the accompanying drawing showing in the Figure an active instrument 10 schematically. The active instrument 10 includes light sources in the form of light emitting diodes 12, 14, 16 radiating in the infrared range and being observable by two cameras 24 responsive to infrared radiation. From images detected by the cameras 24 the location of the instrument 10 in space can be determined by image processing.

The instrument 10, for example a surgical instrument or a „pointer“, further includes a means 18 for wireless communication such as an infrared interface for data transfer. By this means the instrument 10 can be identified. Also a wireless control of the instrument 10, such as turning off and on the light sources 12, 14 and 16 or changing their brightness, is possible.

The power supply for the light sources 12, 14 and 16 and for the means 18 comprises a buffer for the power supply such as a capacitor 20. The buffer 20 is charged by the solar

204420" 04947650